PATENT SPECIFICATION (11) 1 407 052

1 407 052

(21) Application No. 47477/72 (22) Filed 13 Oct. 1972
(31) Convention Application No. 2 151 397 (32) Filed 15 Oct. 1971 in (33) Germany (DT)
(44) Complete Specification published 24 Sept. 1975
(51) INT. CL.: B32B 3/28 33/00 // 27/42 29/02
(52) Index at acceptance
B5N 0328 2704 2742 2900 2902 3120 3300
B6J A2

(54) LAMINATED BOARD PRODUCTION

(71) We, DYNAMIT NOBEL AKTIENGESELLSCHAFT, a German Company, of 521 Troisdorf, Near Cologne, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to the production of laminated boards from resin-impregnated cellulosic sheet materials.

Heat-resistant laminates are generally produced from thin layers formed of cellulosic material and which have been impregnated with precondensates of thermosetting resins. A decorative sheet for imparting to the laminate a particular appearance (pattern, colour) is usually employed beneath or as the surface layer. These decorative sheets can be cellulose webs which are impregnated with melamine resin and which are dyed in different colours. The precoated, impregnated layers which have been assembled together are then cured at a pressure of about 100 kg/cm² and at a temperature in the range of from 140-150°C in multi-layer presses. From 10-20 impregnated layers may be heat pressed together in this way. The presses are usually loaded in a semi-automatic or fully automatic manner. Hitherto, it has not been possible to produce a laminate with a roughened surface, unless the press is provided with a specially roughened member, usually a correspondingly formed press plate, to impart the desired surface relief to the laminate. This method of operation is somewhat costly and when used on a continous basis, only makes it possible to produce a constantly repeating pattern-wise roughening. It has not been possible to modify the aforesaid procedure by using a decorative sheet of the aforesaid type having surface relief since the relief would be flattened out during the hot pressing.

[Price 33p]

According to the present invention there is provided a process for the production of a laminated board structure having surface relief, which comprises stacking a plurality of cellulosic sheets which are impregnated with thermosetting resin precondensates on either side of a separating sheet or an assembly of separating sheets and including within each said plurality of cellulosic sheets structural material capable of imparting surface relief to the board structure, one said impregnated cellulosic sheet which is incapable of imparting surface relief to the board structure and which is disposed between structural material and said seperating sheet(s) being coloured, and/or patterned in order to impart a decorative appearance to the board, hot pressing the assembly thus obtained in a press to cause the relief pattern of the structural material to be imparted to the sheets ajdacent the separating sheet(s), removing the separating sheet(s) from the hot pressed assembly and thus obtaining a said laminated board structure from either side of the separating sheet(s).

In general, the separating sheets, of which from one to three are preferably used, will be interposed between identical assemblies of the cellulosic sheets, structural material and coloured and/or patterned cellulosic sheets, the order and nature of the components of the assemblies being the same in either direction from the separating sheets. Thus, taking the assembled stack in section, the cellulosic sheets, structural material and coloured and/or patterned cellulosic sheets will be disposed in mirror-image symmetry on either side of the separating sheet(s).

By arranging structural inlays providing surface relief or roughening of the laminate within the laminate it is possible to develop a surface relief independently of the top sheet and irrespective of its own appearance. A characteristic feature of the process accord-

ing to the invention is that the formation of relief on the surface of the laminate is effected from the interior, i.e. by the particular layer formation employed, and not, as with the know process, by printing in a pattern from outside. Furthermore, the surface relief is soft in relation to that achieved with pattern printing techniques.

The sharpness of the surface relief achieved will depend on the depth in the laminate at which the structural reinforcements are situated. For the sharpest relief the structural inlay can be positioned between the coloured and/or patterned sheets and the remaining sheets of the laminate, with the coloured and/or patterned sheet constituting the surface sheet of the laminate. Alternatively, one or more impregnated paper sheets can be provided between the structural inlay and the top. The greater the depth at which the structural inlay is included in the laminate structure, the weaker will be the surface structure which is imparted by the incorporated structural bodies. However, the surface pattern produced will then have a soft and harmonic appearance. The extent of surface relief can be varied in accordance with the thickness of the structural material used, in addition to the depth of inclusion.

The structural material incorporated in the laminates produced according to the present invention can be used as such, or impregnated with precondensates of thermosetting resins. The structural inlays can be formed for example of wood, glass, straw, metal, cork or textile fibres, e.g. in the form of woven fabrics formed of coarse textile fibres.

One or more separating sheets can be interposed between the two laminate-forming assemblies. The separating sheets can consist, for example, of cellulose webs, which are impregnated with a release agent, for example, Turkey red oil, soap or, preferably, a silicone oil or resin. After the pressing operation, the separating sheets are withdrawn and two laminates with a roughened surface are obtained in one working operation.

The various sheets constituting the laminate are impregnated with the usual precondensates of thermosetting resins used in the production of laminates, including precondensates of phenols, urea and melamine with formaldehyde. Such precondensates can also be used to impregnate the structural inlays. Melamine resins are preferred for this purpose.

The laminates comprise cellulosic layers which are coloured and/or patterned, e.g. they can be dyed in a single colour or in a colour pattern of one or more colours. These layers are impregnated with thermosetting resin and can constitute the surface layers of the laminates which are produced.

When the coloured and/or patterned sheets do not constitute the surface layer of the laminate, it should be borne in mind that since they are to impart a decorative appearance to the finished laminate they should not be situated in the laminate-producing assembly too remote from the surface layers.

An example of a layer assembly to be subjected to heat pressing to produce two laminates by the process according to the invention is as follows:

1. A cellulose outer sheet, weight 80 g/m², impregnated with melamine resin.
2. Several sheets of strong inlay paper (soda-kraft insulating paper, weight 130 g/m², impregnated with a phenolic resin, e.g. seven such inlay sheets are required for a laminate having a thickness of 1.3 mm).
3. One sheet of pure cellulose, weight 25 g/m², impregnated with melamine resin.
4. Woven textile fabric formed of coarse fibres as reinforcing inlay.
5. One sheet of pure cellulose, weight 25 g/m², impregnated with melamine resin and dyed.
6. Two separating papers.
7. One sheet of pure cellulose, weight 25 g/m², impregnated with melamine resin and dyed.
8. Woven textile fabric formed of coarse fibres as reinforcing inlay.
9. One sheet of pure cellulose, weight 25 g/m², impregnated with melamine resin.
10. Several sheets of strong inlay paper (soda-kraft insulating paper, weight 130 g/m², impregnated with phenolic resin.
11. One cellulose outer sheet, weight 80 g/m², impregnated with melamine resin.

For a better understanding of the invention and to show how the same can be carried into effect, reference will now be made, by way of example only, to the accompanying drawing, in which the two figures show different layer formations to be arranged between two pressure plates (not shown) of a multi-layer press for pressing the sheets into a thermoset resin-impregnated laminate by the process according to the invention.

Referring to Figure 1, there are assembled in sequence, five strong paper inlays 1a to 1e, for example, soda-kraft paper, which are impregnated with a phenolic resin, a structural inlay 2 which can be embedded in resin, if desired, and which can be for example, a woven textile fabric formed of coarse fibres, a sheet 3 consisting of a cellulose web which is impregnated with melamine resin and which is dyed to give a decorative appearance and which is to form the top surface of a laminate. There then follows a separating inlay 4, e.g. a cellulose web which is impregnated with a release agent, such as Turkey red oil, a soap or a

silicone oil or resin, and then, in reverse order, the elements required for a second such laminate, the decorative sheet coming first.

When the pressing operation carried out during the production of the laminates is complete and the assembly shown in Figure 1 is removed from the press, the separating inlay 4 is withdrawn, two laminates are obtained each of which contains on its upper surface, provided by the top sheet 3, a surface relief developed in accordance with the structural inlay 2.

The layer assembly shown in Figure 2 differs from that shown in Figure 1 in that the structural inlay 2 is arranged at a greater depth within the laminate board being interposed between strong paper inlays 1b and 1c rather than on top of the inlay 1a as in Figure 1. In this way, it is possible to reduce the intensity of the surface relief imparted to the laminate.

WHAT WE CLAIM IS:—

1. A process for the production of a laminated board structure having surface relief, which comprises stacking a plurality of cellulosic sheets which are impregnated with thermosetting resin precondensates on either side of a separating sheet or an assembly of separating sheets and including within each said plurality of cellulosic sheets structural material capable of imparting surface relief to the board structure, one said impregnated cellulosic sheet which is incapable of imparting surface relief to the board structure and which is disposed between the structural material and said separating sheet(s) being coloured and/or patterned in order to impart a decorative appearance to the board, hot pressing the assembly thus obtained in a press to cause the relief pattern of the structural material to be imparted to the sheets adjacent the separating sheet(s), removing the separating sheet(s) from the hot pressed assembly and thus obtaining a said laminated board structure from either side of the separating sheet(s).

2. A process as claimed in Claim 1, wherein the separating sheet(s) is/are interposed between identical assemblies of said cellulosic sheets and structural material, the order and nature of the components of the assemblies being the same in either direction from the separating sheet(s).

3. A process as claimed in Claim 1 or 2, wherein from one to three separating sheets are employed together in the assembly.

4. A process as claimed in any one of the preceding claims, wherein the separating sheets are formed of cellulosic material impregnated with a release material.

5. A process as claimed in Claim 4, wherein the release material is selected from Turkey red oil, soaps, and silicone oils and resins.

6. A process as claimed in any one of the preceding claims, wherein the structural material comprises wood, glass, straw, metal, cork or coarse textile fibres.

7. A process as claimed in Claim 6, wherein the structural material is a woven fabric formed of coarse textile fibres.

8. A process as claimed in any one of the preceding claims, wherein the structural material is embedded in or impregnated with a precondensate of a thermosetting resin.

9. A process as claimed in Claim 8, wherein the thermosetting resin is a melamine resin.

10. A process as claimed in any one of the preceding claims, wherein said coloured and/or patterned cellulosic sheet is impregnated with a melamine resin.

11. A process as claimed in any one of Claims 1 to 10, wherein a plurality of said impregnated cellulosic sheets are interposed between the structural material and said separating sheet(s).

12. A process as claimed in any one of Claims 1 to 11, wherein the coloured and/or patterned cellulosic sheets serve as a surface layer of the laminated board structures which are produced.

13. A process as claimed in any one of Claims 1 to 11, wherein the cellulosic sheet serving as the surface layer of the laminated board structure is impregnated with a melamine resin.

14. A process as claimed in Claim 1, substantially as hereinbefore described with reference to Figure 1 or 2 of the accompanying drawing.

15. A laminated board structure having surface relief, whenever produced by the process claimed in any one of the preceding claims.

HASELTINE, LAKE & CO.,
Chartered Patent Agents,
28 Southampton Buildings,
Chancery Lane,
London, WC2A 1AT.
Agents for the Applicants.

Printed for Her Majesty's Stationery Office by The Tweeddale Press Ltd., Berwick-upon-Tweed, 1975.
Published at the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

1 407 052 COMPLETE SPECIFICATION
1 SHEET

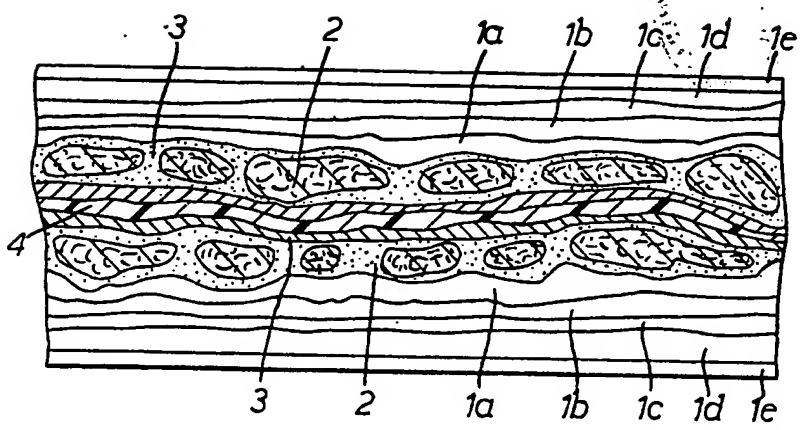

FIG. 1.

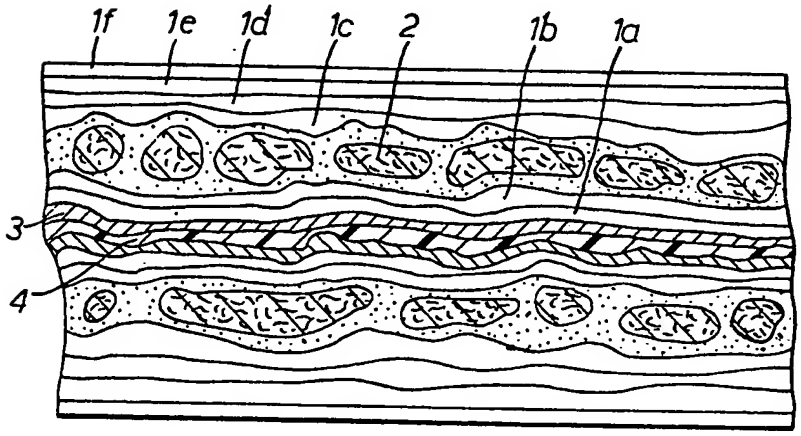

FIG. 2.